

**METHOD AND SYSTEM FOR  
DEVELOPING TEACHING AND  
LEADERSHIP CHARACTERISTICS AND  
SKILLS**

**U.S. Patent Application Serial No.  
10/016,905**

**Filed December 14, 2001**

**Attorney Docket No. D4701-00198**

**Exhibit Y**

**DOCUMENT DETAILS**

Project title	:	Transforming Learning Web Application
Document name	:	Q1397-FS
Document type	:	Functional Specification
Project number	:	Q1397
Created by	:	M. Southall, R. Ingram, F. Conner
Date of creation	:	25 August 2000
Updated by	:	R. Ingram
Last update	:	07-September-2000
Version number	:	1.01

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# **1 Document status**

## **1.1 Introduction**

This Functional Specification is applicable to the project TransformingLearning.com. The Broadband Communications reference is Q1397. Broadband Communications Ltd. (herein referred to as BROADBAND) has been contracted by Transforming Learning (herein referred to as TLC) to perform the complete project. This document identifies the methodology and rationale for the implementation of the project.

## **1.2 Authority**

This document was produced by Matt Southall, Rob Ingram and Fiona Conner of BROADBAND. The production of the document was sanctioned by Michael Von der Geest (Project Manager) of TLC.

## **1.3 Contractual Status**

This document is a deliverable of the contract Q1397 and as such shall be approved by both BROADBAND and TLC and is subject to formal change control procedures after official release.

## **1.4 Associated Documents**

This document relates specifically to:  
Discrete Content Information Summary  
Flowcharts  
Algorithm List

## 2 Demo Site

### 2.1 Introduction

The Demo site will be used by TLC as a marketing tool, and will aim to give a “taster” of what the finished application will offer. The functionality of the finished application will be demonstrated by means of designed screen shots which the user will be “led through” via the site navigation.

This section of the Functional Specification should be read in conjunction with Appendix 1 – Demo Site Map and Appendix 2 – Demo Site Content.

### 2.2 Design

The Demo site will aim to present the essence of the “look and feel” of the finished application. It is appreciated that design will progress post-completion of the demo site, and that the finished application will in all likelihood look different to some degree.

### 2.3 Functionality

The following list represents the core functionality of the demo site:

- The site will consist of a collection of static HTML pages with “screenshots” (designed graphics) which will demonstrate the look of the finished application.
- The functionality of the finished application will be demonstrated as the user follows a “presentation” of different user types (Teacher, Headteacher, Schools Advisor).
- Navigation will be by means of the user clicking links or buttons.
- Either popup windows which appear when the user moves the mouse over the content or static sub-windows will highlight certain pieces of content.
- The facility will exist for users to ask a question using a form with the fields shown below:
  - “What would you like to know?” [Free text]
  - “Priority” [Pull-down menu. Possible values are “Moderate”, “Urgent”, defaulting to “Moderate”]
  - “Your contact details”
    - “Your Name” [Free text]
    - “Your E Mail Address” [Free text]

The contents of the form will be directed to TLC via e mail to a mailbox to be specified by TLC.

- Although the content in the demo site will not be data driven, a database will be used in order to capture details of users who would like to receive follow up information and updates.
- There will be a feedback form which will reside under the “Keep Me Posted” page which will submit to the database. This form will contain the fields given below:
  - “Name” [Free text]
  - “What is your Role?” [Pull-down menu. Possible values are “Teacher”, “Headteacher”, Schools Advisor]
  - “Where do you Work?” [Free text]



- [Pull-down menu allied to above question. Possible values are "School", Local Education Authority, "Education Action Zone", "Other"]
- "Name of Organisation" [Free text]
- "Your Email Address" [Free text]
- "I Prefer to be Kept in Touch By" [Pull-down menu. Possible values are "E Mail", "Post", defaulting to "E Mail" if field is not blank]
- "Your Postal Address"
  - "Line 1" [Free text]
  - "Line 2" [Free text]
  - "Town" [Free text]
  - "County" [Free text]
  - "Postcode" [Free text]
- "Do you have any specific comments or questions?" [Free text]

The hidden "Category" field will derive its value based on the value the user selected for "Role". If the user selected "Teacher", the value will be set to "User", if any other user type was selected, the value will be set to "Buyer".

- It is understood that the data in the database should be in a format compatible with an existing marketing database in use at TLC. This will be achieved by ensuring that each new record added to the database will add the following values to fields "source", "status" and "permission" respectively:
  - website
  - prospect
  - 3

## 2.4 Technological Constraints

The Demo Site will be subject to the same Client Specification as the main application, notably that it will be designed for browser versions 3 and upward, and that it will assume that users have Javascript enabled. Refer to section 8.1 for further details.

## 2.5 Site Map

Pages and navigational structure to be incorporated in the Demo Site are detailed in Appendix 1 – Demo Site Map and Appendix 2 – Demo Site Content

## 2.6 Hosting

The Demo Site will be hosted by an ISP with support for ColdFusion, as this will be used in certain sections of the site. TLC are responsible for sourcing the ISP. Broadband are responsible for uploading the completed Demo Site, and will require FTP access to the chosen ISP in order to accomplish this.

## 3 Functional Breakdown

### 3.1 Introduction

This section will describe each of the functional components of the TLC application. Each subsection will outline the main tasks being carried out and the pre and post conditions for each element.

The components that will be described in this section are:

- Initial Registration
- Login Control
- School Manager Creation
- Set Creation and Rater Nomination
- Tracking and Rater management
- Questionnaires, comprising:
  - Questionnaire Completion
  - Individual Questionnaire Processing
  - Individual Questionnaire Data Cleaning
- Dataset Data Cleaning
- Data Markers
- Teacher/Headteacher Feedback, comprising:
  - Theory
  - Context
  - Feedback
  - Emotions
  - Prioritise
  - Investigate and Action Planning
- School Manager Feedback Calculation
- School Manager Feedback
- EA Officer Feedback Calculation
- EA Officer Feedback
- User Survey
- Handling Forgotten Passwords
- Changing User Passwords
- Offline Scheduler

### 3.2 Initial Registration

#### 3.2.1 Overview

Initial registration covers the first attempt of any user to authenticate themselves to the system. The user types involved are:-

- Headteacher
- Primary Teacher
- Secondary Teacher
- EA Officer
- Adult Rater
- Primary Student Rater
- Secondary Student Rater

This initial authentication will be based on either a simple unique individual ID (for raters) or a combination of school/EA ID and individual ID. These IDs will most likely be based on alphanumeric strings. A certain number of these strings will be valid as licences for particular user types or specified as being particular raters. For a 7-letter string consisting of the letters 'a-z' and the numbers '0-9' there are over 78 billion permutations. This would

provide for a high degree of security, making licences and rater IDs effectively unguessable.

Only headteacher and rater IDs will be bound to particular institutions before initial registration. For other users this will occur when their user record is created.

Input to this system could be from multiple sources (e.g. Rater registration, EA Officer registration, Teacher registration etc). The system will be able to perform appropriate registration options based on the input source and the individual ID (which will be flagged in the database as being "Headteacher", "EA Officer" etc). School managers do not pass through this process as their login details are defined by the headteacher.

On completion, the registration system will perform a transparent 'login' to the system.

### 3.2.2 Inputs

A unique individual ID (from user)  
An optional school or EA ID (from user)

### 3.2.3 Outputs

Login (redirect to login page and pass in valid details).  
Creation of new user record (for all user types, notably excluding primary rater).  
Username (stored to database for all user types, excluding rater).  
Password (stored to database for all user types, excluding primary student rater).  
Aide memoire question and answer (stored to database for all users with a password in case it is forgotten, see section 3.16.)  
Deletion of individual ID (where ID was a licence, excluding rater where the licence will be used as a username).

### 3.2.4 Process Description

See chart IR, CONS. This chart is a consolidation of a set of "per-usertype" initial registration charts:-

- IR, EA (Education Administrator)
- IR, AR (Adult Rater)
- IR, HT (Headteacher)
- IR, PT (Primary Teacher)
- IR, ST (Secondary Teacher)
- IR, PSR (Primary Student Rater)
- IR, SSR (Secondary Student Rater)

All of which are included for reference.

## 3.3 Login Control

### 3.3.1 Overview

This subsystem deals with all return visits from users after completion of "Initial Registration". Users will be expected to provide both a username and a password in order to log in. The system will be able to identify the user uniquely by this username/password combination.

It is anticipated that some users (e.g. primary student raters) will complete all tasks after being automatically logged in by the initial registration and will not therefore need to use a separate login procedure. This system will nevertheless accommodate login attempts from the few exceptions.

Headteachers and teachers will be asked to complete a short background questionnaire the first time they log in (usually immediately after the initial registration process.)

### 3.3.2 Inputs

A unique username (or individual ID in the case of a rater.)

A password (except for primary student raters.)

Note: both of the above are either directly input by user or known implicitly from automated login following initial registration.

### 3.3.3 Outputs

User will be authenticated to the system.

User will be uniquely identifiable.

Background data on headteachers and teachers stored in the database.

System will display appropriate page with options currently available to that user, including an option to return to the appropriate point in a partially completed task.

### 3.3.4 Process Description

See charts:

- LIC, ALL
- BQ, HT & T

## 3.4 Create School Manager

### 3.4.1 Overview

Headteachers will be provided with the option of creating a school manager account. This will be used to view summary feedback on the school as a whole. The use of this account is not necessarily limited to the headteacher and may be shared between members of the school.

This process may also be used to change the details of the school manager account or delete it completely.

### 3.4.2 Inputs

User identified as headteacher.

### 3.4.3 Outputs

School manager username and password saved to database, removed from database or amended.

### 3.4.4 Process Description

See chart CSM.

## 3.5 Create set and Nominate Raters

### 3.5.1 Overview

'Set Creation' is the process whereby a user's 'dataset' is created. A dataset is the set of all data pertaining to a particular individual ('self') at a particular time and (for non-headteachers) with respect to a particular class.

The process of creating a new set involves creating a set of new records in the database and, in the case of teachers, populating some of these with input from the user's set questionnaires.

In T1, the first time a user uses Transforming Learning in an academic year, all set creation will be implicit and transparent to the end user, except that a teacher must name a set. The phase one system will automatically create a new dataset for each 'self' if they do

not already have a dataset created (a prerequisite for any questionnaires etc.) Where necessary the system will present appropriate background questionnaires based on the user type.

This process also involves the nomination of the raters who are to answer the questionnaires belonging to this dataset. The user will enter the name and email address (if available) of the raters and the system will generate a unique identifier for each. This ID will either be emailed to the rater or, if no email address is available, made available in a printable format. Once raters have been nominated the user will be asked to set a deadline by which they must have completed their questionnaires.

In T2 newly created sets will be matched to a particular set from T1. The user will have the option of using the same raters from T1 in T2 or nominating new raters. Users will also have an opportunity to amend their background questionnaire data to reflect changes in their circumstances. This subsystem must provide the user with the facility to select any of their datasets in order to view the appropriate feedback, tracking data etc.

### **3.5.2 Inputs**

Unique authenticated user.

### **3.5.3 Outputs**

Empty dataset ready for population with raters, questionnaire data etc. (In T2 linked to appropriate T1 dataset.)

Rater IDs created and saved in database.

Email sent to raters if address available.

Printed rater details if requested.

Deadline for questionnaire submissions set.

### **3.5.4 Process Description**

See charts:

- CSNR, T
- CSNR, HT
- CSNR, T2
- CSNR, HT2

## **3.6 Tracking and Rater Management**

### **3.6.1 Overview**

The tracking system will provide an overview of the user's progress. A single screen will show which questionnaires have been completed and by whom (self or which rater) as well as details concerning what stage the user has reached on the path through theory, feedback and action planning etc. The display will highlight potential problems such as questionnaires not near completion as deadlines approach or raters who have not yet registered on the system after a given period of time has elapsed since their nomination. The deadline for questionnaires to be completed may also be changed within this process.

If a rater has been rejected for any reason during the process of questionnaire completion and processing the user will be given the option to replace that rater. This will follow the same format as the rater nomination described in section 3.5.1.

Where a user has more than one dataset, tracking information would be dataset specific. i.e. the user would have to explicitly select a different dataset (e.g. from a dropdown) in order to see the tracking information for that set.

### **3.6.2 Inputs**

Unique user.

Dataset identified.

### 3.6.3 Outputs

Tables showing progress of self and raters through process for this dataset.  
Rejected raters replaced.  
Questionnaire deadline reset if required by user.

### 3.6.4 Process Description

See chart TR, CONS.

## 3.7 Questionnaires

### 3.7.1 Overview

This section details the three modules involved in collecting and processing individual questionnaire submissions for self and raters. These processes are distinct from those used to collect background data etc. There are several different questionnaire types covered by this system:-

- Headteachers Context For School Improvement (Climate)
- Headteachers Leadership Styles
- Classroom Climate (Primary Schools)
- Classroom Climate (Secondary Schools)

### 3.7.2 Questionnaire Completion and Initial Validation

#### 3.7.2.1 Overview

This system presents a set of questions to the user and records their answers. For teachers, the set of questions presented may be altered according to data gathered in the set questionnaires (e.g. some questions will not be appropriate for teachers who do not have a classroom and/or do not set homework.)

Adult raters are asked a question about their knowledge of the headteacher's performance. If they do not fulfil the criteria they will be rejected before they start filling in the questionnaires.

The process will also include some initial data validation, primarily checking for incomplete question pairs (where the question requires actual and ideal values) and large numbers of unanswered questions. In the former case the system will insist that both parts of the question pair be filled in. In the latter case the user will be prompted to answer more questions but the questionnaire will be accepted provided that less than 20% of questions are blank.

#### 3.7.2.2 Inputs

Identified user type.  
Data set identifier.  
Relevant questions identifier (e.g. homework questions)

#### 3.7.2.3 Outputs

Raw data for questionnaire recorded to dataset in database. May be partial data if the questionnaire has not been completed.  
Completion status of questionnaire altered.

#### 3.7.2.4 Process Description

See charts:

- COQ, HT1 (Headteacher Climate)
- COQ, HT2 (Headteacher Leadership)
- COQ, PT (Primary Teacher)
- COQ, ST (Secondary Teacher)
- ROQ, AR1 (Adult Rater Climate)
- ROQ, AR2 (Adult Rater Leadership)

- ROQ, PSR (Primary Student Rater)
- ROQ, SSR (Secondary Student Rater)

Algorithms:

- QBb1 to QBb4
- QBa2
- QBa3
- QAc7
- QBc2
- QBc3
- QAd7
- QBd1 to QBd4
- QBf2
- QBf3
- QBe2
- QBe3
- QAg1
- QBg2
- QBg3
- QAh1
- QBh2
- QBh3

### 3.7.3 Individual Questionnaire Data Cleaning

#### 3.7.3.1 Overview

Questionnaire data cleaning is an overnight process performed whilst load on the system is low. This event occurs if all questionnaires in a users' set are flagged as complete, i.e. both the climate and leadership styles questionnaires must be complete for headteachers or those rating headteachers, otherwise just the climate questionnaire must be complete.

Depending on the type of questionnaire the cleaning process might include: checking that the data are not overly biased towards one end of the scale, checking that the user has recognised reversed questions and confirming that an adequate number of the questions have been answered. Data may be rejected if any of these tests fail.

#### 3.7.3.2 Inputs

Validated questionnaire data for self or rater.

#### 3.7.3.3 Outputs

Cleaned questionnaire data that is ready for processing.

If data fail tests: flag for rejected data and email to self indicating a rejected rater.

#### 3.7.3.4 Process Description

See charts:

- IQC, AR1 (Adult Rater Climate)
- IQC, AR2 (Adult Rater Leadership)
- IQC, PSR (Primary Student Rater)
- IQC, SSR (Secondary Student Rater)

Algorithms:

- QCf1 to QCf3
- QCe1
- QCe2
- QCg1
- QCg2
- QCh1 to QCh3

### 3.7.4 Individual Questionnaire Processing

#### 3.7.4.1 Overview

Questionnaire data processing is an overnight process performed whilst load on the system is low. This event occurs if a questionnaire set (both climate and leadership styles, if applicable) is flagged as cleaned ready for processing.

This system takes the clean data for an individual questionnaire and calculates summary values for each dimension and leadership style. It will also perform some calculations in relation to national norms where appropriate.

#### 3.7.4.2 Inputs

Clean questionnaire data for self or rater.

#### 3.7.4.3 Outputs

Processed dimension/leadership styles values for the individual questionnaire saved to database.

#### 3.7.4.4 Process Description

See charts:

- IQP, HT (Headteacher)
- IQP, PT (Primary Teacher)
- IQP, ST (Secondary Teacher)
- IQP, AR (Adult Rater)
- IQP, PSR (Primary Student Rater)
- IQP, SSR (Secondary Student Rater)

Algorithms:

- QDb1
- QDb2
- QDa1 to QDa3
- QDc1
- QDc2
- QDd1
- QDd2
- QDf1
- QDf2
- QDe1 to QDe3
- QDg1
- QDg2
- QDh1
- QDh2

## 3.8 Dataset Data Cleaning

### 3.8.1 Overview

Dataset data cleaning is an overnight process performed whilst load on the system is low. The event occurs when the questionnaires of all raters for a given dataset have been processed or if enough raters' questionnaires have been processed and the 'self' indicates that they wish to initiate the process. The data relating to the user's own questionnaire are not included in this process.

Dataset cleaning involves a number of per-dimension or per-leadership style calculations across the data for all raters. Checks are then carried out on the results of this processing with a number of possible outcomes. These include: the rejection of scores for an individual rater for an individual dimension or flagging of dimensions as being outlying or skewed.



### 3.8.2 Inputs

Processed dimension/leadership styles data for  $n$  raters of the current dataset.

### 3.8.3 Outputs

Clean pre-processed data for all dimensions/leadership styles across raters.  
Flags indicating outliers and skewed data.

### 3.8.4 Process Description

See charts:

- SQC, AR1 (Adult Rater Climate)
- SQC, AR2 (Adult Rater Leadership)
- SQC, PSR (Primary Student Rater)
- SQC, SSR (Secondary Student Rater)

Algorithms:

- QEf1 to QEf8
- QEf9
- QFf1
- QFf2
- QEe1 to QEe3
- QEe5 to QEe7
- QEe9
- QFe1 to QFe4
- QEg1 to QEg8
- QEg9
- QFg1
- QFg2
- QFg4
- QEH1 to QEH8
- QEH9
- QFH1
- QFH2

## 3.9 Data Markers

### 3.9.1 Overview

Once questionnaire data is valid, clean and pre-processed (skew and outlying values flagged) it will be ready for processing to create the data markers. These markers are calculated according to algorithms specified by Hay and are used to control the feedback process. Once these markers are calculated, the raw data should no longer be needed and will be archived (for Hay and in case re-calculation is necessary at a later date).

The process then acts on a set of clean questionnaire data and markers to produce a number of graphs that will be presented to the user as feedback. The graphs will broadly illustrate the user's score in relation to population norms and comparisons between actual and ideal aspects of their own data and between their own data and that of their raters. In the initial version the graphs will be generated as GIF files.

In T2 additional processing will be carried out to produce comparisons between data in T1 and T2.

The data marking process will be carried out off-line and the graphs generated will be stored to be presented to the user during Feedback. In order to reduce resource consumption all graphs will be kept for a period of one month (or specified period), after which they will be removed from the server. If a user attempts to view their feedback after

this period the graphs will be re-generated for immediate presentation and again stored for a period of one month.

### **3.9.2 Inputs**

Complete valid, clean and pre-processed dataset. All the data necessary for processing will be present in the database.

### **3.9.3 Outputs**

Complete set of data markers for that dataset.

GIF files containing graphs illustrating the results of the questionnaire processing.

### **3.9.4 Process Description**

See charts:

- DM, HT (Headteacher and Adult Rater)
- DM, PT (Primary Teacher and Student Rater)
- DM, ST (Secondary Teacher and Secondary Student Rater)

Algorithms:

- QGa1 to QGa3
- QGa6 to QGa9
- QGb1 to QGb13
- QGc1 to QGc9
- QGd1 to QGd13

## **3.10 Teacher/Headteacher Feedback**

### **3.10.1 Overview**

The feedback system presents to the user a summary of the analysis of questionnaire results for a given dataset. This will relate to their own questionnaires and those of their raters with comparisons to national norms where appropriate.

### **3.10.2 Theory**

#### **3.10.2.1 Overview**

The theory section of the feedback process is designed to help the users to properly interpret the data that they will receive by providing familiarisation with the process and background to the theory of the evaluation model being used. Participants will be lead through a combination of explanatory screens, with various levels of detail being provided if they wish to drill down, and case studies with simple interaction capabilities. In addition background information will be provided on the way in which people respond to feedback and the opinions of others.

Most of the definitions and explanations provided will be made available for users who wish to refer back to them during later stages of the process.

Once the subsection has been completed the users will be advised to pause in order to assimilate the information they have been given before continuing with their feedback. Completion of this process is mandatory before further feedback will be provided. However, users may return to refresh their knowledge of the theory at any point.

In T2 the information presented to the user during the model explanation and case studies will differ to take account of the comparison between T1 and T2 data.

#### **3.10.2.2 Inputs**

User identified.

Flag showing whether theory has already been completed by this user.

### 3.10.2.3 *Outputs*

Completion of the theory section is flagged to the system so that the user is allowed to continue with feedback.

On first completion if the user's feedback is not ready they are informed that they will be notified when they may proceed with the process. Otherwise the user is advised to take a break before moving on to their feedback. However, this is not enforced and if the feedback is ready the user may pass directly on.

### 3.10.2.4 *Process Description*

See charts:

- TH, T1 (Teacher, T1)
- TH, T2 (Teacher, T2)
- TH, HT1 (Theory Headteacher, T1)
- TH, HT2 (Theory Headteacher, T2)
- CASE, HT1\_1 (Case Studies Headteacher, T1)
- CASE, HT1\_2 (More Case Studies Headteacher, T1)
- CASE, HT2\_1 (Case Studies Headteacher, T2)
- CASE, HT2\_2 (More Case Studies Headteacher, T2)

## 3.10.3 **Context**

### 3.10.3.1 *Overview*

This subsection will gather data on what is happening in the user's environment and what aspects of their work they wish to change and improve in the near future. It takes the form of a short introduction and an exercise where the user input is actually gathered.

### 3.10.3.2 *Inputs*

User identified and has completed theory.

### 3.10.3.3 *Outputs*

Incidents exercise answers saved to database.  
Aspiration text gathered if not already completed.

### 3.10.3.4 *Process Description*

See charts:

- CON, T1, T2 (Teacher, T1 & T2)
- CON, HT1, HT2 (Headteacher, T1 & T2)

## 3.10.4 **Feedback**

### 3.10.4.1 *Overview*

In this subsection the user is presented with their personalised feedback based on the analysis of their own questionnaires and those of their raters. They are introduced to the feedback process and then presented with each of the graphs generated in Section 3.9 in turn for each dimension and leadership style (for headteachers.) The graph will be accompanied by text annotations that are drawn from the database based on the results currently being displayed. The order in which the dimensions/styles are presented will be determined algorithmically. At the end of each dimension and style user reaction data, prioritisation and reflective text will be gathered and stored in the database.

After all dimensions and styles have been presented individually a summary will be provided comparing the rater's actual to ideal scores and the user's overall results to population norms, again accompanied by appropriate text. The user will then input reactions to the summary data.

Throughout the process the user will also be able to enter textual notes into a jotter that will be stored in the database.

In T2 additional charts will be shown for T1-T2 comparisons.

#### 3.10.4.2 *Inputs*

User completed incidents exercise from context.

#### 3.10.4.3 *Outputs*

Free text reflections, DAWA option selection and priority selection for each dimension/leadership style saved to database.

Free text reflections and DAWA option selection for summary saved to database.

Jotter data to database.

#### 3.10.4.4 *Process Description*

See charts:

- FEED, PT1 (Primary Teacher, T1)
- FEED, ST1 (Secondary Teacher, T1)
- FEED, HT1\_1 (Headteacher Climate, T1)
- FEED, HT1\_2 (Headteacher Styles, T1)
- FEED, PT2 (Primary Teacher, T2)
- FEED, ST2 (Secondary Teacher, T2)
- FEED, HT2\_1 (Headteacher Climate, T2)
- FEED, HT2\_2 (Headteacher Styles, T2)

Algorithms:

- TF1
- TF2a
- TF2b
- TF3
- TF4
- TF12
- TF14
- TF13a
- TF13b
- TF1(2)
- TF2a(2)
- TF2b(2)
- TF13a(2)
- TF13b(2)
- TF14(2)
- HF1
- HF2a
- HF2b
- HF3
- HF4
- HF5
- HF6a
- HF6b
- HF12
- HF1(2)
- HF2a(2)
- HF2b(2)
- HF5(2)
- HF6a(2)
- HF6b(2)
- HF12(2)

## 3.10.5 Emotions

### 3.10.5.1 Overview

The emotions section of feedback is designed to summarise the user's reactions to the previous feedback section and allow them to start thinking about how they may begin to address any issues that have arisen. Users are presented with an algorithmically produced matrix showing their reactions to each dimension or leadership style and an assigned priority. They will be allowed to change their reaction (on reflection) or the priority values and may drill down for more information on various aspects of the matrix.

### 3.10.5.2 Inputs

Feedback section complete and DAWA and priority values gathered.

### 3.10.5.3 Outputs

Revised DAWA values and priority values per dimension/style saved to database.

### 3.10.5.4 Process Description

See charts:

- CRY, T1 (Teacher, T1)
- CRY, T2 (Teacher, T2)
- CRY, HT1 (Headteacher, T1)
- CRY, HT1 (Headteacher, T2)

Algorithms:

- TF3
- TF5
- TF9
- HF3
- HF9

## 3.10.6 Prioritise

### 3.10.6.1 Overview

This section presents a matrix similar to that of section 3.10.5 but without the DAWA or priority values. It provides a mechanism for the user to narrow down the focus of their prioritisation prior to action planning. They will be asked to select a number of dimensions or styles that have issues that they wish to work on immediately. The system will algorithmically check if they have set a reachable target and advise them if they have not. The matrix will also provide access to more detailed background information on the dimensions in relation to their own context.

In T2 additional algorithms will be used to help users build on their work from T1.

### 3.10.6.2 Inputs

Table of values from 3.10.5.

### 3.10.6.3 Outputs

Subset of dimensions/styles chosen for further action.

### 3.10.6.4 Process Description

See charts:

- PRI, T1 (Teachers, T1)
- PRI, T2 (Teachers, T2)
- PRI, HT1 (Headteachers, T1)
- PRI, HT2 (Headteachers, T2)

Algorithms:

- TF4

- TF6
- TF7
- TF14
- HF4
- HF10
- HF11
- HF13

### 3.10.7 Investigate and Action Planning

#### 3.10.7.1 Overview

The final phase of feedback is a process of providing information on the competencies required for each of the dimensions selected in section 3.10.6 and assigning dates and resources to actions required to make improvements in the desired areas.

The user is presented with a matrix of their chosen dimension. For each dimension they will then be lead through detail of the competencies. Headteachers will additionally be lead from a dimension to the relevant leadership styles, each of which have an associated set of competencies. At each stage they can select from set action points to save to the action planner or can input as free text their own actions. When all dimensions have been completed the user is shown a table of actions, populated by their earlier choices or text input, to which they may assign dates, resources and priorities or add more actions.

In T2 additional algorithms will be used to help users reflect and build on their progress since T1.

If after a given time has passed since investigation was completed no actions have been posted to the action planner the user will be sent a reminder email. Actions will be flagged as major and minor tasks. Email reminders will also be sent as major actions become due.

#### 3.10.7.2 Inputs

Prioritised dimensions from previous section.

#### 3.10.7.3 Outputs

Competency (and style for headteachers) options and text (for action planning matrix) to database.

Action plan data to database.

Email reminders (see Appendix 7.)

#### 3.10.7.4 Process Description

See charts:

- VEST, T1 (Teachers, T1)
- VEST, T2 (Teachers, T2)
- VEST, HT1\_1 (Headteachers, Styles, T1)
- VEST, HT1\_2 (Headteachers, Competencies, T1)
- AP, HT1 (Headteachers, Action Planning, T1)
- VEST, HT2\_1 (Headteachers, Styles, T2)
- VEST, HT2\_2 (Headteachers, Competencies, T2)
- AP, HT2 (Headteachers, Action Planning, T2)

Algorithms:

- HF7
- HF14
- HF14(2)

## **3.11 School Manager Feedback Calculation**

### **3.11.1 Overview**

This is a weekly process run during the night that calculates summary data for all teachers within a school. It also calculates historical data if appropriate and data for individual subjects and key stages.

### **3.11.2 Inputs**

Data available for a specified number of teachers.

### **3.11.3 Outputs**

Processed data and charts for summary data, key stages and subjects.

### **3.11.4 Process Description**

See charts:

- SQC, SM

Algorithms:

- SM24 to SM44

## **3.12 School Manager Feedback**

### **3.12.1 Overview**

The school manager feedback process has two sections. The first is an introduction to the theory of the feedback model similar to that detailed in section 3.10.2. The second displays charts containing summary data for the school and more detailed breakdowns by subject or key stage. Data are presented as charts and are accompanied by suggestions for possible actions to address potential problems.

### **3.12.2 Inputs**

School data available.

### **3.12.3 Outputs**

### **3.12.4 Process Description**

See charts:

- TH\_SM1\_SM2 (Theory, T1 & T2)
- FEED, SM1 (Feedback, T1)
- FEED, SM2 (Feedback, T2)

Algorithms:

- SM1
- SM2
- SM8 to SM23

## **3.13 Education Authority Officer Feedback Calculation**

### **3.13.1 Overview**

This is a weekly process run during the night that calculates summary data over a number of registered schools, subjects and key stages within the education authority. It also calculates historical data if appropriate and data for individual schools.

### **3.13.2 Inputs**

Data available for a specified number of schools.

### **3.13.3 Outputs**

Processed data and charts for summary data, key stages and subjects.

### **3.13.4 Process Description**

See charts:

- SQC, EA1
- SQC, EA2

Algorithms:

- EA27 to EA50

## **3.14 Education Authority Officer Feedback**

### **3.14.1 Overview**

The EA officer feedback process has two sections. The first is an introduction to the theory of the feedback model similar to that detailed in section 3.10.2. The second displays charts containing summary data for the schools within the education authority. The officer may view data by school, subject or key stage with each option presenting a chart of averages and suggestions for possible routes for improvement.

### **3.14.2 Inputs**

EA officer feedback calculated.

### **3.14.3 Outputs**

### **3.14.4 Process Description**

See charts:

- TH, EA1 & EA2
- FEED, EA1
- FEED, EA2

Algorithms:

- EA1 to EA26
- EA51

## **3.15 User Survey**

### **3.15.1 Overview**

This process comprises two surveys carried out on a random number of users of the system – once following completion of a questionnaire and once following completion of action planning. They ask a few short questions regarding each part of the process.

The randomisation of recipients is as follows:

- every 100<sup>th</sup> teacher
- every 50<sup>th</sup> headteacher
- every 50<sup>th</sup> school manager
- every 10<sup>th</sup> education authority officer
- 

For questionnaire completion in addition to the above:

- every 300<sup>th</sup> adult rater
- every 300<sup>th</sup> secondary student rater



### 3.15.2 Inputs

Follow on from feedback and if selected.

### 3.15.3 Outputs

Answers to 6 post questionnaire questions, mixture of options and free text, stored to database.

Answers to 6 post action planning questions, mixture of options and free text, stored to database.

### 3.15.4 Process Description

See chart:

- US

Algorithms:

- UQ1 to UQ4

## 3.16 Forgotten Passwords

### 3.16.1 Overview

This subsystem is designed to handle many of the situations where users forget their passwords before the need to escalate to the helpdesk. This facility will not be able to deal with users who forget both their password and their username but it is anticipated that this will be a rare occurrence because users will be allowed to choose their own unique username. The basis of the process is the *aide memoire* question that the user entered during the initial registration phase. In the event of a failure to respond correctly to the question, or the input of an invalid username, the user will be referred to the telephone helpdesk.

### 3.16.2 Inputs

A unique username (or individual ID in the case of a Rater.)

*Aide memoire* question and answer.

### 3.16.3 Outputs

The old password will be replaced with a new value.

### 3.16.4 Process Description

See chart FP, ALL.

## 3.17 Change Passwords

### 3.17.1 Overview

This process allows users to change their passwords to maintain security. Raters and school managers are not allowed to change passwords using this mechanism. The school manager password may be changed by the headteacher.

### 3.17.2 Inputs

A unique and valid username and password.

*Aide memoire* question and answer.

### **3.17.3 Outputs**

The old password will be replaced with a new value entered during the process.

### **3.17.4 Process Description**

See chart CP.

## **3.18 Offline Scheduler**

### **3.18.1 Overview**

The offline scheduler lists pre-scheduled and system events. These will be triggered either by time (e.g. questionnaire has not been submitted 2 weeks prior to the deadline) or by event (e.g. rater was not appropriate). Refer to Appendix 7 – Scheduled Events for a full list of events and triggers.

## 4 Data Structures

### 4.1 Data Dictionary

This section will describe the data structures to be used to store the dynamic elements of the application. These fall into four broad categories that overlap in various areas. The categories are:

- User data, including user and institutional data (schools and LEAs.)
- Instrument data – elements describing functional components of the system such as questionnaires, questions and dimensions
- Dataset data – elements relating to a single dataset such as a group of questionnaire responses and associated processed results
- Feedback data – closely related to dataset data, elements to be used in the presentation of feedback to the user and to store data entered by the user.

The elements will be listed and described in a data dictionary and their relationships defined in associated high level Entity Relationship Diagrams (these can be found in Appendix 5 – Entity Relationship Diagrams).

### 4.2 Data Dictionary Table

	Entity	Main Fields	Description
<b>User Data</b>  This section describes data relating to individuals accessing the system and their institutions. It includes only data that will not change greatly over time.	Licence	ID User type	Unique ID to identify users of the system. Pre-generated and assigned to a particular user type. Only headteacher and rater IDs are associated with particular users before initial registration. All IDs except rater are destroyed during initial registration.
	Self/manager	Username (ID) Password Name User type AM question AM answer Background questionnaire data	Data pertaining to individual users of the system gathered during initial registration and first login. For teachers and managers (school and EA) the initial licence ID is replaced with a user defined username. Raters will retain their licence ID as username and primary raters not will be allowed to enter a password. All users that have a password will be asked for an aide memoire question and answer in case they forget the password. The entities will be combined into a single User entity but have been separated out here to highlight the differences between the raters and other users.
	Rater	Licence ID [Password] Name User type [AM question AM answer] Background questionnaire data Validity?	
	School	ID Name Address...	Static data identifying a school.

	Entity	Main Fields	Description
	School Dataset	ID Date ...	Summary data across a single school.
	EA	ID Name Address	Static data identifying an education authority.
	EA Dataset	ID Date ...	Summary data across all (registered) schools in an EA.
<b>Instrument Data</b>  This section describes a set of entities that hold core data that are used to define functional elements of the system.	User type	ID Value	The permissible types of user. Currently defined as: Head, Teacher, Rater, Education Officer and School Manager. Sub types will be implied from background data.
	Questionnaire set	User type ID Questionnaire ID	Definition of the relationship between user types and individual questionnaires.
	Questionnaire	ID Introductory text	Definition and description of a questionnaire including a description.
	Question	ID Text Scale ID Type	An individual question to be used on one or more questionnaires. Should define the text of the question and refer to the scale it should use. Also points to its now/ideal pair.
	Qn scale	Range	A scale to be associated with a question.
	Scale point	ID Value Text	A point on a scale and its associated text.
	Dimension	ID Questionnaire ID Name Description	Definition of a dimension within a questionnaire. Dimensions are associated with one and only one questionnaire and each questionnaire must contain at least one dimension.
	Dimension questions	Dimension ID Question ID Order Pair Weight	Definition of the relationship between questions and dimensions. This entity also defines attributes of the questions that may be specific to the questionnaire associated with the dimension. Initially these are: scale reversal, actual/ideal pairing and question weight (for possible future use.)
	Control parameter	ID Value	A parameter to control an algorithm.

	Entity	Main Fields	Description
	Norms	Dimension ID Value	Set of values describing national norms to be used for comparison during the feedback process
	Competency	Dimension ID Option value Text	Definition of a competency associated with a dimension
<b>Dataset Data</b>  This section describes entities forming the dataset that is associated with one pass through the questionnaire process for a user. A dataset will be for either T1 or T2 and, for teachers, associated with a particular class.	Dataset	ID User ID Date Status	Definition of a dataset containing its unique ID, the ID of its owner, creation date and status.
	Status type	Status ID Value	Status value to be associated with various tasks, e.g. not started, started but not complete, complete.
	Questionnaire raw	ID Dataset ID User ID Questionnaire ID Status Save point Answer values Validity?	Definition of a raw dataset as entered by self or rater.
	Question answer	Questionnaire ID (raw or recoded) Question ID Value	Actual answer value for an individual question.
	Questionnaire recoded	ID User ID Recoded data Dimension averages	Questionnaire after recoding of reversed questions.
	Bookmarker	User ID Task Status Bookmark	Record of the status of a task assigned to an individual. Also stores a bookmark so that a user returning to a half-completed task may resume it at the relevant point.
	Dimension data	Self average ideal/actual Rater average ideal/actual Marker Gap? Dimension ORL flags Rater ORL flags Dimension skew flags Chart ID	Final processed data to be used in the generation of charts for feedback. Contains mean values for the dimension in question plus the gap values and data on ORLs and skew. Also includes a reference to the chart if it exists.
	Chart	ID File ref.	A chart for a given dimension. Contains a reference to the physical file for the chart.
	User background	Variable user data	Data about a user that may vary between datasets.

	Entity	Main Fields	Description
<b>Feedback Data</b>  These entities form part of the dataset data but are significant enough to warrant a separate description. They relate to the data that are related to or collected during the feedback process.	Aspiration	Dataset ID Text	User aspiration text Bk2 or B16b.
	Incidents exercise data	Dataset ID Options	Answer to incidents exercise Bk3 or B16d.
	Reflective questions - dimension	Dataset ID Dimension ID Text	Text for per-dimension reflective questions.
	DAWA - dimension	Dataset ID Dimension ID DAWA value	Value for per-dimension DAWA option.
	Priority	Dataset ID Dimension ID Priority level (h, m, l)	Priority associated with a dimension for action planning
	Memory pad	Dataset ID Dimension ID Text	Textual notes made during the feedback process
	Reflective question - norms	Dataset ID Text	Text answers to reflective questions based on the comparison of user's data with national norms
	DAWA - norms	Dataset ID DAWA value	DAWA values for user's reaction to comparison with national norms
	Action	Dataset ID Dimension ID Completion date Resources Priorities Status	Action to be carried out for prioritised dimension. Reference to dataset and dimension and data related to the completion of the action such as time scale, resources, priorities and status.
	Style reaction	Dataset ID Dimension ID Reaction (yes/no)	Yes/no answer to whether the headteacher is surprised by the leadership style identified.
	Style emotional reaction	Dataset ID List of styles	Leadership styles to which the head had an emotional reaction.
	Action plan follow-up	Action ID Text	Textual description of the user's progress towards fulfilling their actions from the T1 plan.
	Gap type	Gap Value	Types of gap that may be associated with particular numerical values.
	Dimension text selection matrix	Independent variables Code	Matrix to choose text for feedback for the given dimension based on a number of independent variables.
	Dimension text matrix	Code Text	Text to be displayed for dimension feedback.
	Dimension independent variable		Independent variable forming part of key in dimension text selection matrix.

	Entity	Main Fields	Description
	Dataset text selection matrix	Independent variables Code	Matrix to choose text for feedback for the given dataset based on a number of independent variables.
	Dataset text matrix	Code Text	Text to be displayed for dataset feedback.
	Dataset independent variable		Independent variable forming part of key in dataset text selection matrix.
	Comparison text selection matrix	Independent Code	Matrix to choose text for feedback for the given comparison based on a number of independent variables.
	Comparison text matrix	Code Text	Text to be displayed for comparison feedback.
	Comparison independent variable		Independent variable forming part of key in comparison text selection matrix.
	Phases text selection matrix	Independent variables Code	Matrix to choose text for feedback for the given phases based on a number of independent variables.
	Phases text matrix	Code Text	Text to be displayed for phases feedback.
	Phases independent variable		Independent variable forming part of key in phases text selection matrix.
	Overall text selection matrix	Independent variables Code Norms	Matrix to choose text for feedback for the given dataset based on a number of independent variables and norm values.
	Overall text matrix	Code Text	Text to be displayed for climate overall feedback (teachers).

## 5 CPS

### 5.1 Overview

Broadband licence a custom built Content Production System (CPS).

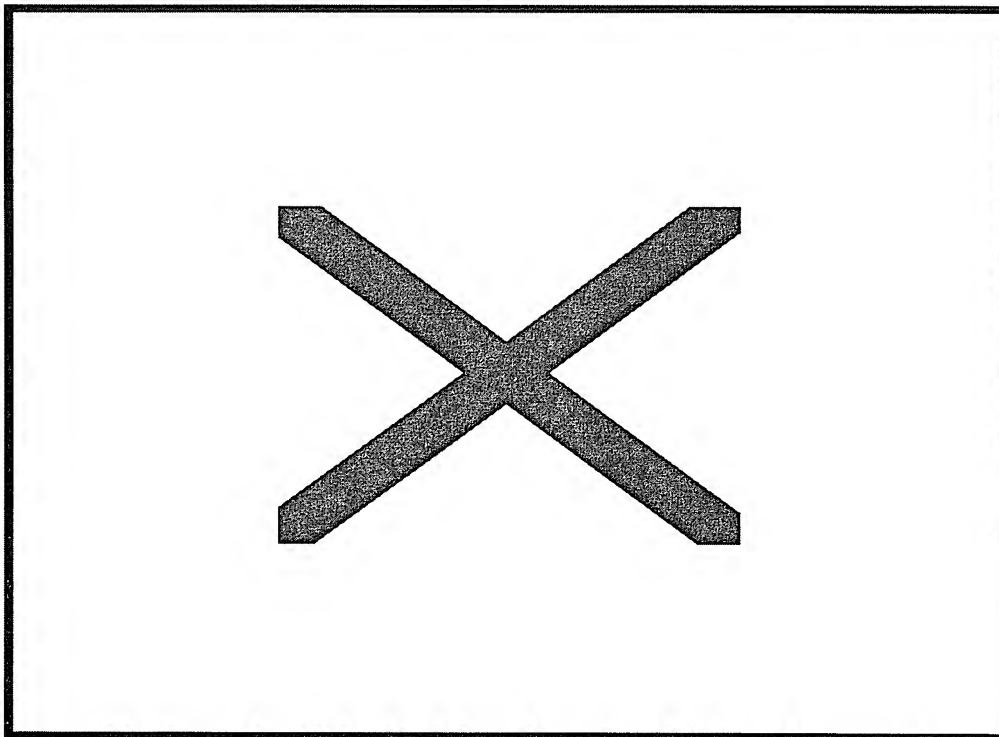
Unlike many such systems, the Broadband CPS is a complete site management system including a multi-user 'permissions' system. This allows full control over who may or may not edit or publish any of the content on a web site.

Our objectives have been to produce a tool with the following characteristics:-

- Enable non-technical staff to perform administrative tasks
- Minimise need for technical intervention
- Present a familiar and intuitive user interface
- Provide a 'WYSIWYG' interface where appropriate
- Enable production and editing of web site content
- Enable production and editing of 'meta data' (e.g. keywords etc)
- Enable general administration of web site
- Enable 'super user' administration of management system itself (e.g. user management etc).

The primary interface through which users are able to edit and publish content is designed to be familiar and intuitive to non-technical staff who are already used to using a desktop environment such as Windows and a web browser such as Internet Explorer. Users are presented with an "Explorer" style tree control in a pane on the left of their browser and a selection of different screens in another pane to its right.

The screen below shows a user editing an existing page within the site. The left hand pane has been used to select the desired page from the site 'tree'. The user then clicked on an 'edit' button below the tree and a set of input fields appeared on the right





hand side. These input boxes allow the user to control both the content of the page (via the WYSIWYG editor near the bottom of the page) as well as meta-data e.g. keywords (for search engines), dates (for diary events), categorisation (for enabling a more user-centric navigation, presenting users with links to 'related content').

Once the user is happy with the edited version they can click 'submit' and the system will render a preview of the page exactly as it would appear in the site. If the user is a 'publisher' they will then have the option to make this page live on the site. If the user is an 'editor', they will be given the option to submit this page for the approval of an authorised publisher. The live site would not allow such a 'proof' page to be displayed to site visitors until it had been published by an authorised user.

The system has evolved beyond a simple 'page' management system into a generic database administration tool for non-technical staff. Individual nodes in the tree control need not represent entities at the 'page' level but rather may represent any item or collection of data within the system. For example, within the Transforming Learning project, there might be folders representing Questionnaires and these folders might contain individual nodes which represent questions. These questions could then be changed individually without resorting to low level access to the database.

The Broadband CPS accomplishes this by relying on a template system. For any particular data type, a 'Content Template' must be built. This template contains all the HTML form elements (and possibly ActiveX controls etc for WYSIWYG editing) to enable users to enter the appropriate information into the database. A second template (or set of templates) are then constructed in order to extract this information from the database and present it to the user.

For the 'Question' example given earlier, a template would be constructed containing all the form input elements pertaining to a question, such as "Question Text", "Question Dimension" (as a dropdown list) etc. A second template (or set of templates) would then be used to extract questions from the database and present them to the user, within the context of the site.

As well as data directly displayed in the site, it is possible to use the CPS to manage meta-data. This meta-data could be 'keywords' or any other parameters governing the web applications behaviour. For example, the CPS could present an interface for managing site defaults such as "Number of Questions Per Page" or "Questionnaire Time Limit" etc.

## 5.2 Application

We anticipate placing the following items under CPS control:-

- All static pages (defined as pages which do not otherwise draw content from the database, e.g. a help page). These pages could be edited using a combination of HTML form input and ActiveX WYSIWYG editors.
- All feedback strings (e.g. text from matrices for constructing customised feedback).
- All question text and parameters (allowing CPS control over questionnaire structure and scales).
- Various other parameters (e.g application defaults such as "Timelimit for Rater Questionnaire Completion = 21 days).

Placing values under CPS control does not exclude them from alteration by direct intervention with the database but rather makes them accessible for non-database administrators. Furthermore, Hay will have the ability to give specific users the permission to alter particular parameters and pages.

## 6 Technical Infrastructure

### 6.1 Estimated Server Load

This server load is a worst-case (with respect to load) scenario projection based on the expected number of users for the second year of the system's lifespan. Numbers are not known exactly but the estimates and assumptions given are pessimistic in order to allow the maximum safety margin.

Expected Usage: 47,500 questionnaires per day

Given a window of 6 hours during which these questionnaires will be completed, this gives an hourly average of 7,916 questionnaires per hour.

Assuming that each questionnaire could result in 70 HTTP requests gives a total of 554,120 HTTP requests per hour.

Dividing by 3,600 gives:- **154 HTTP requests per second.**

Unfortunately the HTTP requests alone does not give a good indication of server load. Flat HTML pages will place very low loads on the server whereas pages which make database queries and then perform complex operations on that data will result in much higher loads on memory as well as CPU. For this reason we have specified a system capable of handling 154 HTTP requests per second along with processing for each request.

### 6.2 Hardware Requirements

Two alternative solutions are suggested. The first will provide for redundancy and load balancing in the web server but not in the database server. The second will provide for redundancy and load balancing for both servers.

All the machines described will be based on Intel processors running Microsoft Windows NT4.0 Server Enterprise Edition as the operating system.

The loads described above would require some sort of multiprocessor system which could also have built in redundancy through the use of:-

- Mirrored / shared RAID array of disks (for disk redundancy)
- Use of at least two load-balanced computers (for system redundancy, load capacity and scalability)

Of the two machine configurations presented below, it is anticipated that Machine Configuration 1 will be used initially. A single database server with a RAID level 1 system would provide disk redundancy, minimising the risk of disk failure.

#### 6.2.1 Machine Configuration 1

Web Servers – 2 machines with the following configuration:

Processors	Dual Intel Pentium III Xeon processors, 800 MHz
Memory	1GB SDRAM
Disk	10GB Ultra Wide SCSI RAID, Raid level 1 (full redundancy.) This would require at least 20GB per machine depending on the RAID configuration.
Network Interfaces	2 x 100Mb Ethernet controllers
Software	Microsoft Windows NT4.0 Server Enterprise Edition, Allaire Cold Fusion Enterprise Server 4.5

Database Server:

Processors	Dual Intel Pentium III Xeon processors, 800 MHz
Memory	1GB SDRAM
Disk	20GB Ultra Wide SCSI RAID, Raid level 1 (full redundancy.) This would require at least 40GB depending on the RAID configuration.
Network Interfaces	2 x 100Mb Ethernet controllers
Software	Microsoft Windows NT4.0 Server Enterprise Edition, Microsoft SQL Server

### 6.2.2 Machine Configuration 2

Web Servers – 2 machines with the following configuration:

Processors	Dual Intel Pentium III Xeon processors, 800 MHz
Memory	1GB SDRAM
Disk	10GB Ultra Wide SCSI RAID, RAID level 1 (full redundancy.) This would require at least 20GB per machine depending on the RAID configuration.
Network Interfaces	2 x 100Mb Ethernet controllers
Software	Microsoft Windows NT4.0 Server Enterprise Edition, Allaire Cold Fusion Enterprise Server 4.5

Database Servers – 2 machines with the following configuration:

Processors	Dual Intel Pentium III Xeon processors, 800 MHz
Memory	1GB SDRAM
Disk	20GB Ultra Wide SCSI RAID, RAID level 1 (full redundancy.) This would require at least 40GB per machine depending on the RAID configuration. In order to provide load balancing for SQL server it would be required that this be configured as a shared SCSI RAID array.
Network Interfaces	2 x 100Mb Ethernet controllers
Software	Microsoft Windows NT4.0 Server Enterprise Edition, Microsoft SQL Server

## 6.3 Server Software Requirements

### 6.3.1 Microsoft Windows NT 4.0 Enterprise Edition (patched to include IIS4.0)

The server's operating system, providing the basic functions necessary to access disk and memory etc. IIS 4.0 is Microsoft's web server. This will service HTTP (web) requests.

### 6.3.2 Microsoft SQL Server 7.0

Microsoft's relational database management system (RDBMS). This will provide data storage, indexing and retrieval services for the web application. In addition, the RDBMS will provide for the use of "Stored Procedures" to optimise particular algorithms and queries and give Hay the ability to alter these algorithms.

### 6.3.3 Allaire Coldfusion 4.5 (Enterprise Edition for Windows NT)

Coldfusion is Allaire's server side scripting engine. It provides methods via which databases can be queried and updated interactively over the web (as well as a huge range of other functionality, independent of client browser versions). Coldfusion also incorporates a version of the Verity search engine as well as a version of BrightTiger ClusterCats load balancing software for dynamic load balancing across multiple machines.

## 6.4 Programming Tools

### 6.4.1 Overview

The following programming languages may be used in various parts of the web application, although this will be an implementation issue. All languages are industry standards and are freely available commercially.

### 6.4.2 HTML

Hypertext Markup Language (HTML) is the language of the web. HTML is used to format text and layout of content in web pages. The application will use HTML as part of the ColdFusion templates used to render the data and images which comprise the front-end of the application (i.e. the web pages the end user sees).

### 6.4.3 Javascript

Javascript is a client-side scripting language. It is executed within a users browser rather than on the server (as ColdFusion is). It is used to add functionality such as mouse roll-over images.

### 6.4.4 CFML

ColdFusion Markup Language (CFML) is the language of ColdFusion. The application templates will be built primarily in CFML, which when executed on the server, will output HTML. CFML will also be used for other server side processing activities, such as retrieving information from the database by passing SQL statements or performing calculations.

### 6.4.5 Java/C++/VB

Java, C++ and VB are all high-level programming languages which may be used to create server-side components.

## 6.5 Client Software Requirements

The client software required to access the CPS will be Internet Explorer 4.0 and above with ActiveX and JavaScript enabled. The browser security settings must be such that ActiveX controls can be downloaded. ActiveX controls to be used will be:-

- Ektron eWebEditPro ([www.ektron.com](http://www.ektron.com))
- Broadband's Tree Control (API documentation will be provided)

This specification is for CPS users only. General site users must conform to the specification laid out in "8.1 Client Specification".

## 6.6 ISP Requirements

Broadband make the following recommendations for minimum requirements which the ISP hosting the web application must meet.

### **6.6.1 Physical Security**

As well as controlling access to the servers (physically) the ISP should provide protection against power cuts and fires. Any fire prevention systems should not damage the hardware. Uninterruptible power supplies should be provided, probably with a combination of battery and generator backup.

### **6.6.2 Network Security**

All machines on the internet are vulnerable to attack by hostile users. In order to minimise the risk of such an attack we recommend that the system be placed behind a firewall of some description. The firewall must prevent unknown users from accessing all ports other than the standard port 80 (HTTP). Authorised users should be allowed access to other necessary ports (either by authentication or IP).

### **6.6.3 Maintenance**

The system should be placed with an ISP who undertake to repair any hardware faults within a specified period of time. Additionally, we recommend the use of an ISP who will provide the same level of support for the operating system and server software (excluding the web application itself).

### **6.6.4 Backup**

The ISP must provide daily backup facilities for the server. Ideally a second network interface would be installed for backup purposes and backups should be periodically removed from site to protect from fire and flood.

## 7 Scalability

This section deals with all aspects of system scalability, ranging from day to day modification through system upsizing to complete redeployment.

### 7.1 System Modification

Many of the algorithms described in "Functional Breakdown" will be implemented as stored procedures within the Microsoft SQL database. As well as providing better performance than ColdFusion code, this will provide Hay with the ability to modify the algorithms independently of the central system. This modification would be performed by expert database administrators.

There are other aspects of the system that would be managed by direct access to the database, notably:-

- Licences – Hay will maintain pools of valid licences for Teachers, Headteachers and EAs.
- School Database - Initial input of schools, school IDs, LEAs and LEA IDs will be performed by Hay as part of the sales process. It is possible that a DfEE database will be used.
- Population Norms – Hay will be responsible for periodic updates of the population norms used during the feedback process.

All application data will be accessible to database administrators and a DBA manual will be provided to enable low level management of that data.

Further changes to the system beyond data management will require ColdFusion skills (see "Maintainability").

### 7.2 Portability

There are two important aspects of portability for this web application:-

#### 7.2.1 Platform portability

*How easy is it to move this complete system to another server/ISP?*

The biggest constraint on the system as defined is Microsoft SQL Server. This will only run on Windows NT and so this application could not be run without a Windows NT machine without incurring long redevelopment times. In contrast, the web front end will be implemented using ColdFusion which is available for several platforms (Solaris, NT and Linux supporting ClusterCats) and could thus run on a broad range of hardware. In fact, it is possible to mix multiple platforms within one ColdFusion cluster.

Should it ever be desirable to move from Microsoft SQL Server, it would be necessary to either duplicate the stored procedure functionality in another database platform or to move the algorithm code into the ColdFusion templates themselves.

Moving the system to a similar or identical hardware setup at another ISP will be a logistics exercise and should be relatively painless.

#### 7.2.2 System portability

*How easy is it to take this system and re-use the components to build another similar web application?*

The system will rely on four broad categories of components:-

- Database (Microsoft SQL Server).
- Core CPS Components (ColdFusion code and ActiveX controls used under licence from Broadband).
- CPS input templates (ColdFusion code developed for and owned by the client).
- Web output templates (ColdFusion code developed for and owned by the client).

The front end site is capable of running without any of the CPS components being present and the back end can be entirely administrated via low level database access, although this would not be recommended.

In order to develop a second TransformingLearning project based on this application, some ColdFusion template development would be required as well as some database administration. If required it would be possible to either remove the CPS completely or to purchase a second licence for its use.  
The bulk of the work in creating a new system would be ColdFusion coding.

Broadband will provide documentation of the API used in the CPS as well as guidelines for building input and output templates.

### 7.3 Increased Load

The system is being built to take advantage of the load balancing facilities within ColdFusion (an embedded version of BrightTiger ClusterCats). As well as providing redundancy (with two or more servers), this will provide for a painless upgrade path in terms of the system's ability to absorb unforeseen loads. The cluster system will enable further web servers to be dynamically added to the setup, providing further processing power. As mentioned above, such systems need not be NT based.

Moving the system from a single database server to a cluster arrangement would involve a more complex procedure. Building a SQL cluster would involve creating a shared RAID setup which could involve some downtime for the existing system. It is anticipated that any future bottlenecks are far more likely to be found in the web servers than in the back end database system.

### 7.4 Maintainability

System modifications beyond database administration will involve some ColdFusion coding. As discussed above, the output templates are completely separable from the back end CPS system.

Such modifications would include fundamental changes to the processes involved in the application (as described in "Functional Breakdown") beyond parametric changes and changes to algorithms (which are implemented as stored procedures).

The following table gives examples of a few system modifications and at what level these modifications would have to take place:-

Modification	Level
Changing text of a question	CPS or database admin
Modifying a static page	CPS or database admin
Changing a parameter within an algorithm	CPS or database admin
Changing an algorithm (e.g. adding extra conditions)	Database admin (editing stored procedures)
Modifying the login process to accept and correctly process a new user type	ColdFusion code
Modifying the feedback process to force users to view each page for at least one minute before moving on	ColdFusion code

## **8 Scope**

### **8.1 Client Specification**

We will ensure that the site is fully accessible in all common web browsers, specifically Netscape 3.0+ and Internet Explorer 3.0+ on PC and Macintosh. We will work to a baseline screen resolution of 640x480 and colour depth of 256 colours. We will assume that users have JavaScript enabled in their browsers, but pages will degrade gracefully in so far as is possible to accommodate those users who do not. As a worst case scenario, the user will be directed to a page telling them that they need to enable JavaScript. We will not assume users have any browser plugins, and for this reason Flash will not be used anywhere on the site.

### **8.2 Phase Two**

TLC and Broadband to decide which functionality will be not be available until Phase Two, and to formulate a strategy for how Phase Two components will be enabled.



## **9 Appendices**

### **9.1 Appendix 1 – Demo Site Map**

## **9.2 Appendix 2 – Demo Site Content**

### 9.3 Appendix 3 – List of Algorithms

- QBb1 – Headteacher climate validation algorithm 1
- QBb2 – Headteacher climate validation algorithm 2
- QBb3 – Headteacher climate validation algorithm 3
- QBb4 – Headteacher pair check algorithm
- QBa2 – Headteacher leadership validation algorithm 2
- QBa3 – Headteacher leadership validation algorithm 3
- QAc7 – Algorithm for questions to display – Primary teacher
- QBc2 – Primary teacher validation algorithm 2
- QBc3 – Primary teacher validation algorithm 3
- QAd7 – Algorithm for questions to display – Secondary teacher
- QBd1 – Secondary teacher climate validation algorithm 1
- QBd2 – Secondary teacher climate validation algorithm 2
- QBd3 – Secondary teacher climate validation algorithm 3
- QBd4 – Secondary teacher pair check algorithm
- QBf2 – Adult rater climate validation algorithm 2
- QBf3 – Adult rater climate validation algorithm 3
- QBf4 – Adult rater pair check algorithm 3
- QBe2 – Adult rater leadership validation algorithm 2
- QBe3 – Adult rater leadership validation algorithm 3
- QAg1 – Algorithm for questions to display – Primary student rater
- QBg2 – Primary student rater validation algorithm 2
- QBg3 – Primary student rater validation algorithm 3
- QAh1 – Algorithm for questions to display – Secondary student rater
- QBh2 – Secondary student rater validation algorithm 2
- QBh3 – Secondary student rater validation algorithm 3
- QCf3 – Adult rater climate reversals check
- QCf1 – Adult rater climate scale check
- QCf2 – Adult rater climate blank check
- QCe1 – Adult rater leadership scale check
- QCe2 – Adult rater leadership blank check
- QCg1 – Primary student rater scale check
- QCg2 – Primary student rater blank check
- QCh3 – Secondary student rater reversals check
- QCh1 – Secondary student rater scale check
- QCh2 – Secondary student rater blank check
- QDb1 – Headteacher reverse climate questions
- QDb2 – Headteacher calculate climate self dimensions
- QDa1 – Headteacher reverse leadership questions
- QDa2 – Headteacher calculate leadership self dimensions
- QDa3 – Headteacher calculate leadership percentiles
- QDc1 – Primary teacher reverse climate questions
- QDc2 – Primary teacher calculate climate self dimensions
- QDd1 – Secondary teacher reverse climate questions
- QDd2 – Secondary teacher calculate climate self dimensions
- QDf1 – Adult rater reverse climate questions
- QDf2 – Adult rater calculate climate self dimensions
- QDe1 – Adult rater reverse leadership questions
- QDe2 – Adult rater calculate leadership self dimensions
- QDe3 – Adult rater calculate leadership percentiles
- QDg1 – Primary student rater reverse questions
- QDg2 – Primary student rater calculate self dimensions
- QDh1 – Secondary student rater reverse questions
- QDh2 – Secondary student rater calculate self dimensions
- QEf1 – Adult rater climate calculate dimension spread
- QEf2 – Adult rater climate calculate dimension average

- QEf3 – Adult rater climate calculate dimension spread index
- QEf6 – Adult rater climate test for ORL per dimension
- QEf7 – Adult rater climate test for rejection
- QEf9 – Adult rater climate count ORL for rater and flag rater if outlier and if  $> z$
- QEf5 – Adult rater climate dimension validity check
- QFf1 – Adult rater climate recalculate calculable dimensions
- QFf2 – Adult rater climate recalculate spread index
- QFf4 – Adult rater climate check for agreement per-dimension and flag
- QEe1 – Adult rater leadership calculate style spread
- QEe2 – Adult rater leadership calculate style average
- QEe3 – Adult rater leadership calculate style spread index
- QEe6 – Adult rater leadership test for ORL per style
- QEe7 – Adult rater leadership test for rejection
- QEe9 – Adult rater leadership count ORL for rater and flag rater if outlier and if  $> z$
- QEe5 – Adult rater leadership style validity check
- QFe1 – Adult rater leadership recalculate calculable styles
- QFe2 – Adult rater leadership recalculate spread index
- QFe4 – Adult rater leadership check for agreement per-style and flag
- QFe3 – Adult rater leadership calculate percentiles per style
- QEG1 – Primary student rater calculate dimension spread
- QEG2 – Primary student rater calculate dimension average
- QEG3 – Primary student rater calculate dimension spread index
- QEG6 – Primary student rater test for ORL per dimension
- QEG7 – Primary student rater test for rejection
- QEG9 – Primary student rater climate count ORL for rater and flag rater if outlier and if  $> z$
- QEG5 – Primary student rater dimension validity check
- QFG1 – Primary student rater recalculate calculable dimensions
- QFG2 – Primary student rater recalculate spread index
- QFG4 – Primary student rater check for agreement per-dimension and flag
- QEH1 – Secondary student rater calculate dimension spread
- QEH2 – Secondary student rater calculate dimension average
- QEH3 – Secondary student rater calculate dimension spread index
- QEH6 – Secondary student rater test for ORL per dimension
- QEH7 – Secondary student rater test for rejection
- QEH9 – Secondary student rater climate count ORL for rater and flag rater if outlier and if  $> z$
- QEH5 – Secondary student rater dimension validity check
- QFH1 – Secondary student rater recalculate calculable dimensions
- QFH2 – Secondary student rater recalculate spread index
- QFH4 – Secondary student rater check for agreement per-dimension and flag
- :
- QGb1 – Calculate AS-IS gaps (Headteacher & adult rater)
- QGb5 – Mark AS-IS gap (Headteacher & adult rater)
- QGb2 – Calculate AR-IR gaps (Headteacher & adult rater)
- QGb6 – Mark AR-IR gap (Headteacher & adult rater)
- QGb3 – Calculate AS-AR gaps (Headteacher & adult rater)
- QGb7 – Mark AS-AR gap (Headteacher & adult rater)
- QGb4 – Derive climate score markers per-dimension (rater only) (Headteacher & adult rater)
- QGa1 – Leadership score markers – self (Headteacher & adult rater)
- QGa2 – Leadership score markers – raters (Headteacher & adult rater)
- QGa3 – Calculate self – rater leadership gaps (Headteacher & adult rater)
- QGa3 – Mark self – rater leadership gaps (Headteacher & adult rater)
- QGb8 – T2 calculate AS-ASH gaps (Headteacher & adult rater)
- QGb10 – T2 mark AS-ASH gaps (Headteacher & adult rater)
- QGb9 – T2 calculate AR-ARH gaps (Headteacher & adult rater)
- QGb11 – T2 mark AR-ARH gaps (Headteacher & adult rater)

- QGb12 – T2 calculate (AS-AR) – (ASH-ARH) gaps (Headteacher & adult rater)
- QGb13 – T2 mark (AS-AR) – (ASH-ARH) gaps (Headteacher & adult rater)
- QGa6 – T2 Calculate self(1) – self(2) leadership gaps (Headteacher & adult rater)
- QGa7 – T2 Mark self(1) – self(2) leadership gaps (Headteacher & adult rater)
- QGa8 – T2 Calculate rater(1) – rater(2) leadership gaps (Headteacher & adult rater)
- QGa9 – T2 mark rater(1) – rater(2) leadership gaps (Headteacher & adult rater)
- QGc1 – Calculate AS-AR gaps (Primary teacher & primary student rater)
- QGc3 – Mark AS-AR gap (Primary teacher & primary student rater)
- QGc2 – Derive climate score markers per-dimension (rater only) (Primary teacher & primary student rater)
- QGc4 – T2 calculate AS-ASH gaps (Primary teacher & primary student rater)
- QGc6 – T2 mark AS-ASH gaps (Primary teacher & primary student rater)
- QGc5 – T2 calculate AR-ARH gaps (Primary teacher & primary student rater)
- QGc7 – T2 mark AR-ARH gaps (Primary teacher & primary student rater)
- QGc8 – T2 calculate (AS-AR) – (ASH-ARH) gaps (Primary teacher & primary student rater)
- QGc9 – T2 mark (AS-AR) – (ASH-ARH) gaps (Primary teacher & primary student rater)
- QGd1 – Calculate AS-IS gaps (Secondary teacher & secondary student rater)
- QGd5 – Mark AS-IS gap (Secondary teacher & secondary student rater)
- QGd2 – Calculate AR-IR gaps (Secondary teacher & secondary student rater)
- QGd6 – Mark AR-IR gap (Secondary teacher & secondary student rater)
- QGd3 – Calculate AS-AR gaps (Secondary teacher & secondary student rater)
- QGd7 – Mark AS-AR gap (Secondary teacher & secondary student rater)
- QGd4 – Derive climate score markers per-dimension (rater only) (Secondary teacher & secondary student rater)
- QGd8 – T2 calculate AS-ASH gaps (Secondary teacher & secondary student rater)
- QGd10 – T2 mark AS-ASH gaps (Secondary teacher & secondary student rater)
- QGd9 – T2 calculate AR-ARH gaps (Secondary teacher & secondary student rater)
- QGd11 – T2 mark AR-ARH gaps (Secondary teacher & secondary student rater)
- QGd12 – T2 calculate (AS-AR) – (ASH-ARH) gaps (Secondary teacher & secondary student rater)
- QGd13 – T2 mark (AS-AR) – (ASH-ARH) gaps (Secondary teacher & secondary student rater)
- TF1 & TF1(2) Secondary teachers Order of Chart Presentation
- TF2a & TF2a(2) Secondary teachers Gap and Absolute Level Analysis – per dimension
- TF2b & TF2b(2) Secondary teachers Gap and absolute levels analysis – across dimensions
- TF3 & Too Many Bad Reactions?
- TF4 Is Data Dodgy?
- TF5 Produce Priority Matrix (Dk1)
- TF6 Produce Investigate Matrix (Similar to TF5)
- TF7 Chance of Success
- TF8 Have They Chosen Any Improvement Areas?
- TF9 Relationship between priority and attitude
- TF12 Primary teachers order of chart presentation
- TF13a Primary teachers gap and absolute level analysis – per dimension
- TF13b Primary teachers gap and absolute level analysis – across dimension
- TF14 & TF14(2) Primary – is data dodgy?
- HF1 & HF1(2) Order of climate chart presentation
- HF2a & HF2a(2) Gap and absolute levels analysis – climate dimensions
- HF2b & HF2b(2) Gap and absolute levels analysis – overall climate
- HF3 Too many bad reactions?
- HF4 Is data dodgy?
- HF5 & HF5(2) Order of presentation of styles charts
- HF6a & HF6a(2) Gap and absolute levels analysis – phases styles
- HF6b & HF6b(2) Gap and absolute levels analysis – styles comparison

- HF7 Identify HT's effective styles per priority dimension
- HF8 Determine what level style is displayed at
- HF9 Produce emotions matrix
- HF10 Produce priorities matrix
- HF11 Chance of success algorithm
- HF12 & HF12(2) Was reaction to styles emotional?
- HF13 Build on strengths (time 2 only)
- HF14 What was level of style and difference vs previous measurement? (time 2 only)
- EA1 Produce table of subjects available
- EA2 Produce school average chart
- EA3-EA17 Produce subject charts
- EA18 Produce table of key stages available
- EA19-21 Produce key stage charts
- EA24 Produce group secondary average chart
- EA25 Produce group primary average chart
- EA26 Produce table of schools available
- EA27 Calculate average of the average rater scores (ie. each set of raters has weighting of 1)
- EA28 Find the minimum of the average rater scores
- EA29 Find the maximum of the average rater scores
- EA30 Calculate the historical average of the average rater scores
- EA31 Calculate the gap - Average-AverageH
- EA32 Mark the gap - Average-AverageH - 5 types - secondary
- EA33 Calculate average of the average rater scores (ie. each set of raters has weighting of 1)
- EA34 Find the minimum of the average rater scores
- EA35 Find the maximum of the average rater scores
- EA36 Calculate the historical average of the average rater scores
- EA37 Calculate the gap - Average-AverageH
- EA38 Mark the gap - Average-AverageH - 5 types - secondary
- EA39 Calculate average of the average rater scores (ie. each set of raters has weighting of 1)
- EA40 Find the minimum of the average rater scores
- EA41 Find the maximum of the average rater scores
- EA42 Calculate the historical average of the average rater scores
- EA43 Calculate the gap - Average-AverageH
- EA44 Mark the gap - Average-AverageH - 5 types - primary
- EA45 Calculate average of the average rater scores (ie. each set of raters has weighting of 1)
- EA46 Find the minimum of the average rater scores
- EA47 Find the maximum of the average rater scores
- EA48 Calculate the historical average of the average rater scores
- EA49 Calculate the gap - Average-AverageH
- EA50 Mark the gap - Average-AverageH - 5 types - secondary
- EA51 Produce table of schools that have registered
- SM1 Produce table of subjects available
- SM2 Produce school average chart
- SM3-SM17 Produce subject charts
- SM18 Produce table of key stages available
- SM19-23 Produce key stage charts
- SM24 Calculate average of the average rater scores (ie. each set of raters has weighting of 1)
- SM25 Find the minimum of the average rater scores
- SM26 Find the maximum of the average rater scores
- SM27 Calculate the historical average of the average rater scores
- SM28 Calculate the gap - Average-AverageH

- SM29 Mark the gap – Average-AverageH – 5 types – primary
- SM30 Mark the gap – Average-AverageH – 5 types – secondary
- SM31 Calculate average of the average rater scores (ie. each set of raters has weighting of 1)
- SM32 Find the minimum of the average rater scores
- SM33 Find the maximum of the average rater scores
- SM34 Calculate the historical average of the average rater scores
- SM35 Calculate the gap - Average-AverageH
- SM37 Mark the gap – Average-AverageH – 5 types – secondary
- SM38 Calculate average of the average rater scores (ie. each set of raters has weighting of 1)
- SM39 Find the minimum of the average rater scores
- SM40 Find the maximum of the average rater scores
- SM41 Calculate the historical average of the average rater scores
- SM42 Calculate the gap - Average-AverageH
- SM44 Mark the gap – Average-AverageH – 5 types – secondary

## **9.4 Appendix 4 – Process Flow Charts**



## 9.5 Appendix 5 – Entity Relationship Diagrams

## 9.6 Appendix 6 – Alpha and Beta Checklist

Module	Completed
Initial Registration	Beta
Login Control	Beta
Set Creation	Alpha/Beta
Set Management	Beta/Phase 2
Tracking	Beta
Rater Management	Alpha/Beta
Questionnaire Completion and Initial Validation	Alpha
Individual Questionnaire Data Cleaning	Alpha
Individual Questionnaire Processing	Alpha
Dataset Data Cleaning	Alpha
Data Markers	Alpha
Theory	Alpha
Context	Alpha
Feedback	Alpha
Emotions	Alpha
Prioritise	Alpha
Investigate and Action Planning	Alpha
School Manager Feedback Calculation	Alpha/Beta
School Manager Feedback	Alpha/Beta
EA Officer Feedback Calculation	Alpha/Beta
EA Officer Feedback	Alpha/Beta
User Survey	Beta
Forgotten Passwords	Beta
Offline Scheduler	Beta

## 9.7 Appendix 7 – Scheduled Events